**Superficial Fungal Infections of the Skin**

* **Dermatophyte infections.**
* **Candidiasis (Moniliasis).**
* **Pityriasis versicolor.**

**Dermatophyte infections**

The dermatophytes include a group of fungi (ringworm) that have the ability to infect and survive only on dead keratin (stratum corneum of the skin, the hair, and the nails). Dermatophytes are classified into 3 genera: Microsporum, Trichophyton, and Epidermophyton.

Clinically, skin infections characterized by active border which is scaly, red and slightly elevated. Vesicles occur in intense inflammation. As the lesion expands, the center becomes relatively clear. This classical pattern of presentation present in all locations except the palms and soles.

Investigations:

* Potassium hydroxide wet mount preparation: dermatophytes appear as translucent, branching, rod-shaped filaments (hyphae) of uniform width with lines of separation (septa) spanning the width and appearing at irregular intervals.
* Culture: is used to identify the species of dermatophytes. There are Mycosel agar and Sabouraud agar.
* Wood’s light examination: it is a device gives light rays with wave length above 365 nm. Hairs fluoresce with a blue-green fluorescence if infected with microsporum species. Hairs fluoresce pale green fluorescence if infected with trichophyton schoenleinii. Pityriasis versicolor fluoresce pale white yellow fluorescence.

**Tinea**

Tinea means fungus infection. Dermatophytes infections are classified by body regions.

**Tinea pedis (Athlete’s foot)**

It is tinea of the foot. Shoes promote warmth and sweating which encourage fungal growth. It is common in men.

Clinical presentations of tinea pedis:

1. *Classical ringworm infection* as described above occurs on the dorsum of the foot.
2. *Interdigital tinea pedis (toe web infection):* the fourth toe web is common site. The web becomes dry, scaly, fissured or white, macerated and soggy. Itching is common. Superadded bacterial infection may complicate the infection.
3. *Chronic scaly infection of the planter surface (hyperkeratotic or moccasin type of tinea pedis):* the entire sole is usually infected and covered with fine silvery white scales. The skin is pink, tender and pruritic. The hands may also be infected. It is rare to see both palms and soles infected simultaneously; rather, the pattern is infection of two feet and one hand or of two hands and one foot. Trichophyton rubrum is the usual pathogen.
4. *Acute vesicular tinea pedis:* it is highly inflammatory infection characterized by vesicular eruption which may fuse into bullae. A second wave of vesicles may follow shortly in the same area or at distant site such as arm, chest, and along the sides of the fingers. These itchy sterile vesicles represent an allergic response to the fungus and are termed *dermatophytid or id reaction.* They subside when the infection is controlled.

Treatment options of tinea pedis:

* Terbinafine 1% cream (Fungicidal, Lamisil) applied twice daily for 1 week.
* For moccasin tinea pedis use oral choices: Fluconazole (Diflucan) 50 mg once weekly for 4 weeks, or Itraconazole (Sporanox) 200 mg twice daily for 1 week. Terbinafine (Lamisil) 250mg once daily for 2 weeks.
* Acute vesicular tinea pedis is treated by oral antifungal agents as above. Secondary bacterial infections treated by antibiotics. Id reaction treated by topical steroids or prednisone 20 mg twice daily for 10 days.

**Tinea cruris**

It is tinea of the groin. It is common in men. It is rare in children. Itching is common. A half moon shaped red brown plaque forms as a well-defined scaling, and sometimes a vesicular border advances out of the crural fold onto the thigh. Involvement of the scrotum is unusual. Unlike candida in which scrotal involvement is common, the involvement is bilateral, the presence of typical fringe of scales at the border, and the presence of satellite papules and pustules.

Differential diagnosis: intertrigo, erythrasma.

Treatment options for tinea cruris:

* Terbinafine 1% cream (Fungicidal, Lamisil) applied twice daily for 1 week.
* Oral choices:
	+ Fluconazole (Diflucan) 150 mg once weekly for 2-4 weeks.
	+ Itraconazole (Sporanox) 100mg twice daily for 1 week.
	+ Terbinafine (Lamisil) 250mg once daily for 1-2 weeks.

**Tinea corporis**

It is tinea of the trunk, limbs and the face excluding the beard and mustache areas in men. It is present as round annular lesion as described previously in classical presentation.

Treatment of tinea corporis: as above in tinea cruris.

**Tinea manum**

It is tinea of the hand. Tinea of the dorsal aspect of the hand is similar to tinea corporis. Tinea of palmar surface has the same appearance as the dry diffuse hyperkeratotic form of tinea of the sole. Tinea of the palm is frequently associated with tinea pedis. Finger nails infection also a frequent accompaniment.

Treatment of tinea manum: as above in tinea cruris.

**Tinea capitis**

It is tinea of the scalp. It occurs frequently in children between 3-7 years of age. Clinically there is cervical or occipital lymphoadenopathy, fungal infection is rarely the cause when neither adenopathy nor alopecia is present.

Clinical types:

1. Non-inflammatory black dot pattern: there is area of hair loss with hairs broken off at the follicular orifice give the appearance of black dots.
2. Inflammatory tinea capitis (kerion): there are one or multiple inflamed boggy tender areas of alopecia with pustules on and/or in surrounding skin. The condition leads to scarring alopecia if not treated promptly.
3. Seborrheic dermatitis like (grey patchy) type: there is diffuse or patchy fine white adherent scales on the scalp. There are tiny perifollicular pustules and/or hair stubs of broken hair.
4. Pustular type: there are discrete pustules or scabbed area without scaling or significant hair loss.
5. Favus: is infection of the scalp with *Trichophyton schoenleinii*. The infection characterized by the presence of yellowish cup-shaped crusts known as scutula. Each scutulum develops round a hair. Adjacent crusts enlarge to become confluent and form a mass of yellow crusting. The condition leads to scarring alopecia if not treated early and promptly.

Treatment options for tinea capitis: the treatment is always systemic, because topical drugs do not penetrate the depths of hair follicles.

* Griseofulvin 15-25 mg/kg/day (microsize) or 15mg/kg/day (ultramicrosize) for 6-8 weeks. Side effects are headache, GI upset and photosensitivity. The drug is well absorbed after fatty meal.
* Fluconazole (Diflucan) 8 mg/kg once weekly for 4-16 weeks.
* Terbinafine (Lamisil) 20-40 kg body weight: 125 mg daily 2-4 weeks, >40 kg body weight: 250 mg daily 2-4 weeks.

**Tinea barbae**

It is fungal infection of the beard mustache areas. Like tinea capitis, the hairs are always infected and easily removed. The hair in bacterial folliculitis resists removal. Tinea begins with small group of follicular pustules. The process becomes confluent in time with development of a boggy erythematosus mass (kerion) with dense superficial crust.

Treatment of tinea barbae is similar to tinea capitis.

**Tinea incognito (steroid modified tinea)**

It is a condition caused by wrong treatment of fungal infection with topical steroids. Topical steroids lead to disappearance of signs and symptoms (masking the infection) but the fungus is actually flourishing. Once the steroids are stopped, the disease reappears and may even become more extensive and severe.

**Candidiasis (Moniliasis)**

The yeast like fungus candida albicans and few other candida species are capable of producing skin, mucous membrane and internal infections. The organism lives with the normal flora of the mouth, vaginal tract and the gut. Pregnancy, oral contraception, antibiotic therapy, diabetes, skin maceration, topical steroid therapy, certain endocrinopathies and factors related to depression of cell mediated immunity may allow yeasts to become pathogenic.

The clinical presentations:

**Monilial vulvovaginitis**

The female present with vaginal itching and/or white thin to creamy discharge.

Treatment options:

* Miconazole (Gyno-daktarin) intravaginal cream or suppositories.
* Clotrimazole vaginal tablets or cream.
* Fluconazole (Diflucan) 150 mg single oral dose.

**Oral candidiasis (thrush)**

Candida albicans can be transmitted to the infants’ oral cavity during passage through the birth canal. Present as white creamy exudates or white flaky adherent plaques. In adult, the disease predisposed by diabetes mellitus, depressed cell mediated immunity, old age, cancer, prolonged corticosteroid therapy, immunosuppression, broad spectrum antibiotic, and inhalant steroid. The presentation is similar to that in infants. It may spread onto the skin at the angle of the mouth then called angular cheilitis (perleche).

Treatment options:

* Oral nystatin suspension.
* Clotrimazole troche.
* Miconazole (Daktarin) oral gel.

**Candida balanitis**

It is common in uncircumcised penis which provides the warm, moist environment. Tender pinpoint red papules and pustules appear on the glans and shaft of penis, white exudates may be present.

Treatment is by miconazole cream twice daily for 7 days, or single oral fluconazole 150mg capsule.

**Candidiasis of the skin folds (candida intertrigo)**

It occurs under pendulous breasts, between overhanging abdominal folds, in the groin and gluteal area and axillae that have heat and moisture. (Intertriginous areas are areas where skin touches skin). Clinically there are macerated pustules and papules under apposing skin surfaces with fringe of moist scale at border. Intact pustules found outside the apposing skin surfaces, this is an important diagnostic sign called satellite pustules. Also the presentation may be as red moist glistening plaque that extends to or just beyond the limits of apposing skin folds.

Treatment is by maintaining dryness. Miconazole topical cream twice daily until rash clears.

**Diaper candidiasis**

An artificial intertriginous area is created under wet diaper, predisposing the area to candida infection with the characteristic red base and satellite pustules and papules.

Treatment: dryness should be maintained by changing the diaper frequently. Miconazole antifungal cream should be applied twice daily until the rash clears. Irritation treated with 1% hydrocortisone cream alternately with the antifungal cream.

**Finger and toe web candidiasis**

Any one who works in moist environment is at risk like cook, and dishwasher. White, tender macerated skin erodes revealing a pink moist base. Treatment is as above.

**Pityriasis versicolor**

It is caused by dimorphic lipophilic yeast pityrosporum orbiculare (round form) and pityrosporum ovale (oval form). The microorganism is also called *Malassezia furfur*.

Lesions begin as multiple small circular macules and patches of various colors (white, pink or brown) that enlarge radially. The color is uniform in each individual. The upper trunk is most commonly affected, then the arms, neck and abdomen. The lesions are asymptomatic but may be itchy. The differential diagnosis: vitiligo, pityriasis alba, seborrheic dermatitis, secondary syphilis, and pityriasis rosea.

Potassium hydroxide examination of the scale shows numerous short hyphae intermixed with round spores giving an appearance of spaghetti-and-meatballs pattern. Wood’s light examination shows irregular pale yellow-to-white fluorescence.

Treatment options:

* Ketoconazole shampoo 2% (Nizoral) daily application for 3 days.
* Selenium sulfide suspension 2.5% (Selsun) applied for 10 minutes every day for 7 consecutive days.
* Itraconazole 200mg once daily for 1 week. *Prophylaxis:* 200 mg twice 1 day per month for 6 months for recurrent disease.
* Fluconazole 300mg single oral dose. Repeated in 2 weeks if needed.
* Ketoconazole 400mg single oral dose. *Prophylaxis:* 400mg once monthly for recurrent disease.

**Reference:**

Thomas P. Habif. Clinical Dermatology, A Color Guide to Diagnosis and Therapy. 5th edition, 2010. Elsevier Inc.